# Lettuce

**ATLANTIC PROVINCES VEGETABLE CROPS GUIDE TO PEST MANAGEMENT 2002 - 2003**

Distributed By:
**FARM EXTENSION SERVICES**
**P.E.I. DEPARTMENT OF AGRICULTURE AND FORESTRY**

Prince Edward Island
CANADA
Agriculture and Forestry
Farm Extension Services

Publication No. 1400A
Agdex No. 250/600
Published January 2002

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## Introduction

Lettuce belongs to the Compositae (sunflower or daisy family). *Lactuca sativa*. It is an annual plant native to the Mediterranean area. Cultivation may have started as early as 4500 BC, perhaps initially for the edible oil extracted from its seeds. Salad lettuce was popular with the Ancient Greeks and Romans. Cultivated lettuce was probably derived from the so called wild or prickley, lettuce *Lactuca sierriola*. The primitive forms of lettuce were loose and leafy. Firm heading forms became well developed in Europe by the 16th Century. Oak leaved and curled-leaf types of various colors were described in the 16th and 17th centuries in Europe. There are 5 types of lettuce (1) Crisphead (2) butterhead (3) Cos or Romaine (4) loose leaf or bunching and (5) stem lettuce (celtuce). Lettuce color for commercial cultivars varies from a yellow-green to dark red and all colors in between.

Head lettuce grows best at 15 to 18°C. Germination takes place at a minimum of 5°C, has an optimum range of 16 to 20°C, and an optimum germination temperature of 20°C (depending on the cultivar and type of lettuce). At soil temperatures over 27°C germination is poor. Hardened seedlings are tolerant (-5°C to -7°C) to frost but mature plants are more sensitive to frost (-1°C) depending on the cultivar. With light frosts only the wrapper leaves are injured so there may be other markets to develop. Warm and dry conditions promote flowing and seed formation (bolting). Bolting

occurs where temperatures over 20°C are maintained day and night. Also tip burn problems are serious under this situation as is bitter flavor. Cool nights are essential for quality lettuce. In the Atlantic area it would seem the early soils in the St. John River Valley and the Annapolis Valley are best suited to early lettuce production (June and July marketings) and that coastal areas would be best suited for July, August, September and October production.

Warm sandy soils are preferred for the early harvest, loam to clay loam or peat for late production. On peat soil lettuce can be produced during hot weather. Good drainage and high organic matter content are essential. A regular supply of water is essential although high humidities and excess water close to the time of harvest can be destructive to the yield and quality of the crop. Fields low in disease must be selected. Sclerotinia drop has been the most serious production problem in the development of head lettuce as a major crop.

Leaf lettuce is produced in tunnel houses and in early field stands from the last week of May until late June. This crop can be produced from late May to October but markets are generally early in the season (before head lettuce is available), or for specialty markets in the H.R.I. Trade. Yields depend on the row spacing as well as size of the required product -- 2000 dozen to 3000 dozen per hectare. Head lettuce for the early market is usually transplanted in late April or Early May for harvest in mid to late June. Head lettuce may be transplanted up to early August depending on the variety and the market. Yields of 2000 dozen per hectare is average and individual fields may yield 3000 dozen per hectare (500 g to 1000 g per head). Romaine lettuce scheduling and yields are similar to head lettuce except that cos lettuce may be grown in tunnel houses for an early crop during the same time period as leaf lettuce (from late May on).

Lettuce is currently an important crop which once was grown in larger quantities in the Atlantic Area. The area of Romaine and head lettuce has increased but it has a long way to go to replace imports. Lettuce is the vegetable which is imported in the largest volume and has the largest dollar value of any vegetable imported into the Atlantic Area during the time it can be produced here. Currently most marketings are through roadside markets or deliveries direct to retail stores and deliveries to wholesalers. If we can control sclerotinia drop, and get adequate cooling equipment we should be able to grow head lettuce successfully but the market is extremely price competitive.

*Nutrient Content:* Useful amounts of several nutrients including Vitamins A and C; and minerals calcium and iron. The nutrient content is highest in the darker green, outer leaves. Low in calories. Each head contains 65 to 70 kilocalories.

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***Seed Treatment*** - Lettuce germinates best at relatively cool temperatures. This crop should be pregerminated in cool rooms during the summer (seeded in modules or peat blocks) as conditions are generally too hot for good germination even if greenhouses are well ventilated.

***Seeding/Planting*** - Begin field seeding as soon as the land can be worked. A succession of seedlings are necessary for continuous cropping in those coastal areas where lettuce can be grown throughout the summer and early fall. Coated or pelleted seed is available so precision seeders may be used. Seed sparsely to reduce thinning. Thin when two or three leaves have formed. Weed control is usually more of a problem with direct seeded fields.

Approximately 275 g of seed will provide transplants for one hectare. Direct seeding requires 1 to 2 kg per hectare unless precision seeded. Lettuce should be seeded at a depth of 0.6 cm or less.

Space rows 30 cm or more apart as determined by machinery. Plants should be spaced 25 to 36 cm apart for head lettuce, and 20 to 30 cm apart for leaf and bib lettuce. Seed sparsely to reduce thinning. Thin when 2 or 3 true leaves have formed.

For transplant production, seed is usually sown in the greenhouse in from March to July, 6 to 8 weeks before field planting. Seedlings are grown in module flats with a 4 to 5 cm spacing, in peat blocks or plant bands. Module trays may also be transplanted with lettuce seedlings. Plants should be hardened for a week to 10 days before field setting.

Thoroughly soak the soil in the flats with starter solution before transplanting. Keep as much soil as possible on the roots. When transplanting to the field, do not set the plants too deep in the soil or small pointed heads may result.

**Crop Management** ▲ to Top

***Beds*** - Lettuce should be transplanted or seeded on raised beds if possible.

***Irrigation*** - A steady supply of moisture is needed for good quality and yields. Irrigation must be monitored along with the weather especially when the crop is approaching maturity since excessive moisture may ruin the crop.

***Plastic*** - Plastic mulches provide a barrier between the soil and the plant foliage. This reduces the potential for plant disease. If black plastic is used, weeds are also controlled. For those growers producing specialty lettuce for the H.R.I. trade plastic mulches should be considered or plastic tunnels may be used for early leaf and romaine lettuce production. Transplants would be set into these structures in mid April. Plans are available from your local vegetable extension specialists. Also, floating row covers are beneficial on this crop if managed for earliness and perhaps for lateness in the season.

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ALL ADDITIONS OF LIME AND FERTILIZER OR MANURES SHOULD BE BASED ON RECOMMENDATIONS FROM A SOIL TEST.

Lettuce would seem to require moderate amounts of soil fertility. Some research has been done in the Atlantic area on lettuce fertility.

***Manure*** - manures are generally not recommended due to its weed seed content and the lack of good selective herbicides registered on this crop.

***Lime*** - should be applied to maintain a soil pH in the range 6.5 to 6.8. On peat soils the pH for optimum crop performance is 5.5 to 6.0.
Under hot conditions lettuce may benefit from foliar calcium sprays to prevent tipburn.

***Nitrogen*** - half of the nitrogen may be broadcast before planting and worked into the soil. The balance is sidedressed 3 weeks after transplanting the crop or after thinning of the seeded crop. On mineral soils up to 100 kg/ha may be required depending on manures and legume soil residue in the soil. Over application of nitrogen can result in rapid growth and tipburn.

***Phosphorus*** - is usually broadcast before planting and worked into the soil but should be banded if possible.

***Potash*** - should be broadcast and incorporated before planting. Lettuce is quite tolerant of salt damage so small amounts of potash may also be banded.

***Sulfur*** - is suggested on soils low in organic matter which are being intensively cropped. Generally these are sandy soils.

***Micronutrients*** - *Boron, copper* and *molybdenum* applications are required in organic or peat soils. Boron may be beneficial on some mineral soils. (Use .2 to .3B in the fertilizer). Minor elements are most conveniently applied in the fertilizer but may be sprayed on the soil and incorporated before planting or applied as a foliar spray(s) to the crop.
Manganese deficiency may show up on high pH soils. Apply foliar sprays starting after establishment with manganese sulfate at 1 to 2 kg of manganese per hectare in 3000 L of water.

***Application Method*** - Broadcast before planting and work in, or preferably band 5 cm below and 5 cm to one side of the seed row. Lettuce with its limited root system, is considered to be a poor feeder. Sidedress nitrogen and potash when necessary. If using transplants use a plant starter high in phosphorus.

**Pests and Pest Control** ▲ to Top

**Weeds**

Herbicides recommended for use on lettuce will not provide total, season long weed control. Good weed control requires integration of cultural and chemical methods. Lettuce should be planted to land free of perennial weeds, where the annual weed seed population has been reduced by cultural practices such as crop rotation, fallowing or stale seedbed. Herbicides should be ordered early to avoid problems of short supply at planting. Care must be taken to avoid fields where residual herbicides from previous years persist in the soil as crop injury may occur.

**Diseases**

**Gray Mold - (Botrytis) fungus**

***Characteristics:*** Gray mold can appear on plants at all stages although initial infection is often on seedlings in the greenhouse. Seedlings look like they have damping off; while older plants rot at the stem or on lower leaves in contact with soil. A slimy rot spread upwards into the head. A dense fuzzy gray mold appears on infected areas and dark, hard sclerotia (fruiting bodies) may also develop. Disease spreads mostly under moist conditions.

***Control:*** Seed should be dressed with suitable fungicide. Use sterile seedbeds and flats and avoid thick stands of seedlings and transplants. Spray greenhouse seedlings at weekly intervals and once or twice later in the field at 10 day intervals. Use a 3 or 4 year crop rotation. Plow down crop refuse promptly after harvest. Orient rows in direction of prevailing winds.

**Lettuce drop - (Sclerotinia) fungus**

***Characteristics:*** Symptoms begin on the stem near the soil surface. A severe wet rot develops rapidly and spreads downward to roots and upward through the head. Once the base of the leaf is rotted, the leaf wilts, withers and dies. Symptoms successively develop from outer to inner leaves. The head becomes a wet, slimy mass. During wet conditions, a white cottony mold develops on rotted plant parts; hard irregular black sclerotia (pea sized bodies) may occur in the mold.

***Control:*** Sclerotia can persist for many years in the soil. Wet conditions favour disease. Avoid, if possible, land where clover, soybeans, snap or dry beans, lettuce, peas, tomatoes, carrots, cucurbits or cabbage have been grown recently. Practice a 3 year rotation with non-susceptible crops (grasses, corn, cereals, onions or beets). After harvest, disc the field promptly to destroy production of sclerotinia. Use row and plant spacings to encourage good air movement or plant on raised beds.

**Dampening Off, Stunt (pythium spp. and other fungi)**

***Characteristics:*** This is a frequent problem in the greenhouse and the field. Lettuce is extremely susceptible. Seedling emergence may be poor. There may be sudden collapse and death of seedlings. Cool, damp conditions favour this disease. Soilless mixes can contain high levels of pythium unless properly treated before use.

***Control:*** Use raised beds or well drained soils for early seeding or transplanting. Properly condition greenhouse soils before seeding and maintain favourable conditions for transplant growth. Use the best available fungicides for seed treatment or soil drenches in the greenhouse.

**Downy Mildew - (fungus)**

***Characteristics:*** Usually only a problem in coastal areas and on late field lettuce. Downy mildew can affect seedlings or mature plants. Symptoms appear first on

oldest leaves. Yellowish or light-green blotchy areas appear on the upper sides of leaves. A white, downy mold then appears on the undersides of the leaf spots; finally, the affected areas die. The fungus overwinters in crop residue. Spores are spread by wind. Spore production is greatest at temperatures below 19°C and at relative humidities approaching 100%.

***Control:*** At first sign of disease, spray with a fungicide at 7 to 10 day intervals, using a spreader-sticker. Carry out a 2 to 3 year rotation. Use cultivars with resistance to this disease.

**Rhizoctonia Bottom Rot (fungus)**

***Characteristics:*** Infection occurs on lower leaves touching the ground. The disease progresses up into the head causing a dark brown, slimy decay. Later the head may dry out leaving a dry, mummified plant. The pathogen lives indefinitely in the soil.

***Control:*** Avoid rotating potatoes and other susceptible crops with lettuce. Grow lettuce on 8 to 15 cm high ridges. Plow down crop residue immediately after harvest.

**Aster yellows - (mycoplasma)**

***Characteristics:*** Yellowing and curling occur on the youngest leaves. At heading, head leaves are dwarfed and curled and heads remain soft. The mycoplasma can overwinter in many perennial weeds and is spread to lettuce by leafhoppers during their feeding.

***Control:*** Eliminate weed hosts in field headlands and ditch banks. Do not plant lettuce adjacent to earlier lettuce plantings that contain infected plants. Grain, grass, carrot or celery crops should not be planted close to lettuce. Apply controls for the leafhopper vector.

**Slime**

***Characteristics:*** A physiological disease of hot, humid weather, often aided by bacteria. The greatest single danger to mature lettuce, it produces a wet, slimy decay on lettuce in the field, in transit or in the market. Usually the large, internal leaves are affected first.

***Control:*** Aim for a sequence of harvests at optimal maturity by successive sowings. Do not overcrowd plants and avoid overwatering. Harvest as soon as mature, pre-cool heads to 1°C and keep them cool.

**Pink Rib (non pathogenic disorder)**

***Characteristics:*** It first appears as a pink discoloration at the base of the mid veins of the lettuce leaves. This discoloration extends throughout the veins of the outer leaves and then extends into the younger leaves. The cause is unknown but high temperatures may be involved since it shows up most during the summer and much less in June, September and October harvests. This problem can cause a high loss of

marketable yield in the Atlantic area.

***Control:*** Crisp head lettuce is most affected during hot weather. Avoid July to mid August harvest schedules. Romaine lettuce and leaf lettuce seem to be much less prone to this disorder.

**Insects**

**Cutworms**

***Characteristics:*** Cutworms are common pests in the Atlantic Provinces. Most of the damage is to newly set plants in the field. Plants are commonly cut off at ground level but some species can climb and feed on the lower leaves of the plants.

***Control:*** See Atlantic Provinces 'Guide to Pest Management' for vegetable crops.

**Aster (six-spotted) leafhopper**

***Characteristics:*** Leafhoppers can carry aster yellows from plant to plant as they feed. They are small (4 mm long), slender, wedge-shaped insects. They are greenish-yellow in color. Once a leafhopper feeds on an infected plant, it can spread it to all the other plants it feeds on. They feed on many other crops such as potatoes, tomatoes, celery, spinach, lettuce, onion and squash.

***Control:*** Planting time treatments include granular or soil-injected insecticides. Alternatively, spraying regularly throughout the season can be done. Spray crop and field boundaries at weekly or twice-weekly intervals from time of transplanting or emergence of seedlings. Twice-weekly applications are only necessary during periods of heavy infestation, usually during late July and early August.

After harvest disk down crop residue immediately. Pest resistance can develop to insecticides so alternate pesticide groups. Monitor leafhopper numbers. Thresholds have been established.

**Cabbage Looper**

***Characteristics:*** The cabbage looper gets its name from the way it forms a loop as it walks. It is a smooth green larvae with two white stripes along the back and two along the sides. The cabbage looper is capable of causing significant damage to lettuce. Cabbage loopers do not winter over in this region. Adult moths migrate into the region during the summer. Cabbage looper tends to be more problematic during late summer.

***Control:*** Monitor moth numbers with traps and apply preventative insecticide sprays as necessary.

**Aphids**

***Characteristics:*** Aphids are small, soft-bodied, slow- moving insects. They are often

found in large colonies on the undersurface of leaves. A colony consists of winged and wingless adults and various sizes of nymphs. Aphids may be black, yellow or pink, but mostly are various shades of green. Lettuce aphids are small, green or pinkish and feed on the inner leaves and within the heads. Other aphids feed on the undersides of leaves and curl or stunt them.

Lettuce root aphids will also feed on the roots thereby stunting the plants especially under dry conditions.

***Control:*** Use granular insecticides and/or foliar insecticides as necessary. Do not second crop lettuce unless insecticide is banded. Also, root aphid can be partly controlled by irrigation.

**Tarnished Plant Bug**

***Characteristics:*** Tarnished plant bugs are small 6 mm long insects, somewhat oval in shape. They are mottled white and yellow with some black marking on the wings. They fly in from nearby hay fields or weedy areas along the margins of fields. They feed along the main veins of the leaf and cause browning along the lesions they make while feeding.

***Control:*** Spray with an appropriate insecticide as needed.

**Slugs**

***Characteristics:*** Slugs eat the leaves of the crop and cover it with unsightly slime tracks.

***Control:*** Baits containing metaldehyde, a specific poison for slugs, can be used but are considered too costly in commercial plantings. Slugs prefer areas which are cool, moist and high in organic matter. Sod crops, weedy fence lines and hedgerows fulfil these conditions. Since slugs can over-winter fairly easily, cultural practices aimed at controlling them should begin at least one year before the susceptible crop is put in.

**Wireworm**

***Characteristics:*** Early in the spring, adult wireworms (click beetles) lay their eggs around grass roots. The larvae hatch in about a week and, depending on the species, will live for 1 to 5 years in the ground feeding on roots and seeds. Wireworms require 3 or more years to complete their life cycle. Wireworms of all sizes and ages are present in the soil throughout the year as there is always an overlapping of generations. The wireworms, or larvae, are yellow, white or darker shades of brown. Fully developed larvae may be 1.2 to 4 cm long and have a hard, smooth surface. When a larva is mature, it pupates in the fall. It then becomes an adult beetle and waits until spring to emerge. Wireworms are often numerous in land that has been in sod for several years. They are also more abundant in heavy poorly drained soil.

Wireworms are sometimes confused with millipedes. Millipedes have numerous pairs of legs and coil up when disturbed, while wireworms have three pairs of legs near the

front of the body and do not coil up.

***Control:*** Avoid planting crops highly susceptible to wireworms in a field that has been recently in sod

SPECIFIC CHEMICAL CONTROLS FOR THE VARIOUS CROP PESTS DISCUSSED MAY BE FOUND IN THE 'GUIDE TO PEST MANAGEMENT' FOR VEGETABLE CROPS.

**Harvesting and Handling** ▲ to Top

Harvest leaf lettuce as soon as the plants are large enough.
Harvest head lettuce as soon as heads become firm. Harvest early in the morning, if possible, and keep cool until marketed.

**Storage and Conditioning** ▲ to Top

Rapidly cooled head lettuce in good condition can be stored for 2 to 3 weeks at a temperature of 0°C, and a relative humidity of 98% or over. Other types of lettuce have shorter storage lives. Vacuum cooling is the best treatment for quickly removing field heat to temperatures near 0°C, and this is effective in extending the storage life of this vegetable. Wilting can be reduced by using individual polyethylene head wraps or open-topped bags in the case of leaf lettuce. Wraps should have ventilation holes to prevent the development of injurious atmospheres inside the package. Avoid storing lettuce with apples, pears, tomatoes or other products that produce ethylene. Ethylene can induce russet spotting on midribs of lettuce leaves.

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(See also General References)

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Prepared by: Horticulture Section, Production Technology Branch, Nova Scotia Department of Agriculture & Marketing on behalf of APASCC and members:

| PEST | PESTICIDE | RATE | DAYS TO | REMARKS |
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| | (Formulation) | Product | HARVEST | |
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| ***Weeds*** ▲ to Top | | | | |
| **Preplant**<br><br>Perennial Weeds including quackgrass | ROUNDUP 356 Sn | 2.5 to 7.0 L/ha | - | Apply in the fall or spring prior to planting. Annual weed control programs will be necessary to control weeds germinating after planting. For quackgrass control apply to actively growing quackgrass when at least 4 new leaves are present. The low rate (2.5 L/ha) will provide a minimum of one season control, while higher rates (4.75 to 7 L/ha) will provide longer term control. The low rate of Roundup should be applied in 50 to 100 L/ha water. If higher water volumes are used add a suitable surfactant. Wait 72 hours before plowing under. Best control of quackgrass is obtained when these herbicides are applied in the fall. |
| | TOUCHDOWN 480 | 2.5 to 7.0 L/ha | - | |
| | GLYFOS | 2.5 to 7.0 L/ha | - | |
| | ROUNDUP TRANSORB | 2.5 to 7.0 L/ha | - | |
| **Preemergence**<br><br>Stale Seedbed Technique | GRAMOXONE 200 Sn | 2.75 to 5.5 L/ha | - | Apply in 300 to 1100 L of water/ha to foliage of the emerged weeds but before the crop has emerged. Use Gramoxone for best control of grasses. Apply Ignite in 110 to 330 L of water per ha. |
| | REGLONE 200 Sn | 2.75 to 5.5 L/ha | - | |
| | IGNITE 15 Sn | 2.7 to 5.0 L/ha | | |
| Germinating annuals | CIPC 4.8 EC | 10.0 | - | For preemergence application in direct-seeded lettuce. Use low rate in cool wet weather to avoid injury and delay in emergence. |
| **Preemergence**<br><br>Annual Grasses and some Broadleaves | KERB 50 WP | 4.4 to 9.0 kg/ha | 55 | Use on mineral soils only. Do not replant a second crop of lettuce in the same season. Kerb can also be applied Preplant Incorporated to direct seed lettuce only. |
| **Postemergence**<br><br>Inter-row shielded | GRAMOXONE 200 Sn | 2.75 to 5.5 L/ha | - | Do not spray solution on the crop plant since it could be injured or killed. Use Gramoxone for best control of grasses. |
| | REGLONE 200 Sn | 2.75 to 5.5 L/ha | - | |
| **Postemergence** | KERB 50 WP | 4.4 to 9.0 kg/ha | 55 | Transplanted lettuce only, apply Kerb 7 to 10 days after transplanting. |
| ***Insects*** ▲ to Top | | | | |
| **Preplant**<br><br>Cutworms | - | | - | See section "Control of Wireworms, White Grubs, Cutworm and Slugs". |
| Aster leafhopper | THIMET 15 G | 7.25 kg/ha > | - | Aster leafhoppers carry aster yellows. Distribute the granules in the fertilizer band on one or both sides of the row at seeding time, or when plants are transplanted in the field. Planting time only. |
| | DI-SYSTON 15 G | 40 to 75 g/100 m row | - | Inject on each side of the seed furrow at planting time only. Do not apply to transplanted lettuce. Under adverse conditions, there may be some delay in emergence, stunting or reduction of stand. Planting time only. |
| Aster leafhopper *continued* | MALATHION 500 EC | 2.5 L/ha | - | Weekly or twice weekly during growing season. Only needed when granules are not used at planting. |

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| | MALATHION 25 WP | 3.4 to 4.5 kg/ha | | 3 days to harvest on head lettuce. 14 days to harvest on leaf lettuce. |
| | SEVIN 50 WP | 2.2 to 3.3 kg/ha | - | Apply when insects or damage appears. 3 days to harvest on head lettuce. 14 days to harvest on leaf lettuce. |
| | SEVIN 85 WP | 1.25 to 2.75 kg/ha | - | |
| | SEVIN 80 SP | 1.5 to 3.0 kg/ha | - | |
| | SEVIN L 420 SU | 1.25 to 2.5 L/ha | - | |
| | RIPCORD 400 EC | 125 ml/ha | 14 | 7-14 day spray schedule. Up to 4 applications per season. |
| | CYMBUSH 250 EC | 200 ml/ha | 14 | 7 to 14 day spray interval. Up to 4 applications per season. |
| Aphids | ADMIRE 240F (transplant drench) | 10.2 ml /1000 plants | 21 | Use only as a transplant tray plug drench. Make sure product reaches the root zone, but does not leach out of the plug. Do not apply to the same field more than oce per season and do not follow with foliar application of ADMIRE. |
| | ADMIRE 240F (foliar spray) | 0.2 L/ha | 7 | Make no more than two sprays per field per season. Do not follow soil application of ADMIRE. |
| | PIRIMOR 50 WP | 0.3 to 05 kg/ha | 7 | Apply if aphids are a problem. |
| | PIRIMOR 50 DF | 300 to 500 g/ha | 7 | |
| | MALATHION 500 EC | 2.5 L/ha | - | Weekly or twice weekly during growing season. Only needed when granules are not used at planting. 14 days to harvest on leaf lettuce. 3 days to harvest on head lettuce. |
| | MALATHION 25 WP | 3.4 to 4.3 kg/ha | - | |
| | DIAZINON 500EC | 1.1 L/ha | 10 | |
| | DZN 600 EW | 0.915 L/ha | 10 | |
| | CYGON 480 EC | 0.7 L/ha | 7 | |
| | LAGON 480 EC | 0.7 L/ha | 7 | |
| | THIODAN 4 EC | 2 L/ha | 14 | Not on leaf lettuce. |
| | MONITOR 480 EC | 1.1 to 2.5 L/ha | 14 | Not on leaf lettuce. |
| | ORTHENE SP | 0.75 to 1.1 kg/ha | 7 | Head lettuce only. Orthene is systemic. |
| Cabbage Looper | DIPEL WP | 1.1 kg/ha | 0 | Other caterpillars may be controlled when these insecticides are used. |
| | THURICIDE HPC | 4.25 L/ha | 0 | |
| | MATADOR 120 EC | 83 ml/ha | 3 | |
| | LANNATE L 215 Sn | 2.25 to 4.5 L/ha | 7 | Do not use on leaf lettuce. |
| | DIBROM 9.6 EC | 1.1 L/ha | 4 | |

***Diseases***

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| Damping Off | FERBAM 76 WDG | 2 kg/1000 L | - | Apply as a soil drench when seedlings first emerge and repeat at 2 week intervals. |
| | RIDOMIL 2G | 25 kg/ha | at planting | Apply Ridomil for control of damping off or stunt diseases caused by *Pythium spp.* Apply in the seed furrow at the time of planting. For direct seeded head lettuce only. Refer to the label for further information. |
| *Botrytis* rot (grey mold) | FERBAM 76 WDG | 2.0 kg/1000 L | 1 | Spray greenhouse grown seedlings before first transplanting and once or twice later at 10 day intervals. |
| | ROVRAL 50 WP | 1.5 kg/ha | 4 | Apply in 300 to 500 L water/ha. Maximum of 4 applications per year, 7 day intervals. |
| Aster yellows disease | - | - | - | Control leafhoppers. SEE ASTER LEAFHOPPERS IN INSECT SECTION |
| Downy Mildew | ZINEB 80 WP | 1.7 to 2.75 kg/ha | 10 | At the first sign of disease, spray at 7 to 10 day intervals. Add a spreader-sticker. |
| | RIDOMIL GOLD MZ 68 WP | 2.5 kg/ha | 14 | For head lettuce only. Apply every 14 days, beginning at thinning. Make a maximum of 3 applications per season. Apply before the outbreak of disease. |
| | ALIETTE 80 WDG | 2.8 kg/ha | 7 | Apply when conditions favor disease development. Do not re-enter within 12 hours of application. |
| *Sclerotinia* | BOTRAN 75 WP | 2.3 to 3.75 kg/ha | 14 | Maximum of 2 applications per year. Apply as a directed spray to lower portion of plant and on soil surface after thinning. Second application at rosette stage. |
| | RONILAN 50 EG | 1.1 kg/ha | 28 | Maximum of 3 applications per year. Apply 1 to 2 days after thinning direct seeded, and 5 to 7 days after transplanting. Second and third applications at 10 day intervals. |